<u>IN THE UNITED STATES PATENT AND TRADEMARK OFFICE</u>

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Assignee   :   Amdahl Corp.

Patent No.   :   6,145,066

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Title   :   COMPUTER SYSTEM WITH TRANSPARENT DATA
                         MIGRATION BETWEEN STORAGE VOLUMES

Art Unit   :   To Be Assigned

Examiner   :   To Be Assigned

Assistant Commissioner
for Patents
Washington, D.C. 20231

<div align="center">

PRELIMINARY AMENDMENT
<u>**PURSUANT TO 37 C.F.R. §§ 1.121 & 1.173**</u>

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SIR:

Pursuant to 37 C.F.R. §§ 1.121 and 1.173, please amend without prejudice the above-identified application (which is being filed under 35 U.S.C. § 251 for United States Letters Patent No. 6,145,066 ("the '066 Patent"), entitled "Computer System With Transparent Data Migration Between Storage Volumes"), as set forth below.

It is respectfully submitted that the present application for a reissue of the '066 Patent, including this amendatory paper under 37 C.F.R. §§ 1.121 and 1.173, fully conforms with the Rules of the Office. In a telephone discussion between the undersigned and Special Program Examiner Pinchus Laufer on Tuesday, April 10, 2001, the formats of the present application and this amendatory paper were confirmed as being proper in view of the present Title 37 Rules, including 37 C.F.R. §§ 1.121 and 1.173.

EL 594611957US

IN THE SPECIFICATION:

Please amend without prejudice the specification as follows:

Please amend the paragraph at lines 24 to 39 of column 8 of the specification (the second full paragraph on column 8) as follows:

The TDMF migration is intended for flexibility, for example, so that multiple MVS/ESA releases are supported (4.2, 4.3, 5.1, 5.2; OS390 V1.1, V1.2, V1.3, and V2.4), so that shared data system environments are supported, so that CKD/E (Count Key Data/Extended) compatible 388x and 399x control units are supported (Read Track CCW (Channel Control Word) is required in the disclosed embodiment), so that 3380 and 3390 device geometries are supported, so that flexible device pairing options are possible (including the use[s] of device pairs with equal track sizes and numbers of cylinders, and the use of device pairs with an unequal numbers of cylinders, which requires the target volume to be equal to or greater than the source volume), so that a single TDMF session can support up to 64[0] concurrent migrations, so that a single TDMF session can support concurrent migrations with differing control unit and device types, and so that optional point-in-time capability is available.

IN THE CLAIMS:

Please amend without prejudice claims 1 to 7 as follows:

1. (Amended) A computer system [having] comprising:

a plurality of storage volumes for storing data used in the computer system[,];

one or more storage control units for controlling I/O transfers of data in the computer system from and to the plurality of storage volumes[,];

one or more application programs for execution in the computer system using data accessed from and to the plurality of storage volumes[,];

one or more operating system programs for execution in the computer system for controlling the plurality of storage volumes, the one or more storage control units and the one or more application programs[,]; and

a data migration program for migrating data from one of [said] the plurality of storage volumes designated as a source volume to one of [said] the plurality of storage volumes designated as a target volume while [said] the one or more application programs are executing using data accessed from and to the plurality of storage volumes, [said] the data migration program including[,]:

a main module to control [the] a start of a migration session when [said] the one or more application programs are using data accessed to and from the source volume, to migrate data from the source volume to the target volume, and to end the migration session whereby [said] the one or more application programs are using data accessed to and from the target volume[,];

a volume module to control [said] the plurality of storage volumes during the migration session[,];

a copy module to control [the] copying of data from the source volume to the target volume during the migration session[,]; and

a monitor module for monitoring I/O transfers to the plurality of storage volumes during the migration session;

wherein at least one of the following is satisfied:

the target volume is larger than the source volume; and

the data migration program provides for allowing a selective non-destructive I/O

operation at the target volume.

2. (Amended) The computer system of claim 1, wherein [said] the main module includes a

communication data set for communications used for controlling data migration, the

communications data set [that is] not being stored on [said] the source volume or [said] the target

volume.

3. (Amended) The computer system of claim 1, wherein [said] the main module establishes

[said] the migration session as a plurality of migration phases for controlling data migration.

4. (Amended) The computer system of claim 1, wherein each of [said] the one or more operating

system programs includes an instance of [said] the data migration program and [said] the main

module establishes one instance of [said] the data migration program as a master instance and

another instance of [said] the data migration program as a slave whereby [said] the migration

session is controlled in a master slave relationship.

5. (Amended) The computer system of claim 1, wherein [said] the main module establishes

[said] the migration session as a plurality of migration phases including an activation phase, a

copy phase, a refresh phase, a quiesce phase, a synchronize phase, a redirect phase, a resume

phase and a termination phase.

6. (Amended) The computer system of claim 1, wherein each of [said] the one or more operating

system programs includes an instance of [said] the data migration program and [said] the main

module establishes a plurality of migration sessions for concurrent data migrations.

7. (Amended) The computer system of claim 6, wherein for each of [said] the data migration sessions each of [said] the operating systems includes an instance of [said] the data migration program and [said] the main module establishes one instance of [said] the data migration program as a master instance and another instance of [said] the data migration program as a slave whereby each of [said] the migration sessions is controlled in a master slave relationship.

Please add without prejudice new claims 8 to 56 as follows:

8. The computer system of claim 1, wherein the target volume is larger than the source volume.

9. The computer system of claim 8, wherein a number of target volume cylinders is larger than another number of source volume cylinders.

10. The computer system of claim 8, wherein the data migration program provides for a purging of the target volume before the data to be migrated is migrated.

11. The computer system of claim 10, wherein the data migration program provides for the purging of the target volume when a purge option is requested.

12. The computer system of claim 10, wherein the purging includes erasing at least one cylinder on the target volume before the copying of data.

13. The computer system of claim 10, wherein the purging includes erasing each target volume cylinder not being used for storing at least a portion of the data to be migrated, the erasing being before the copying of data.

14. The computer system of claim 10, wherein the data migration program provides for the purging of the target volume when a purge option is requested, and the purging includes erasing

each target volume cylinder not being used for storing at least a portion of the data to be migrated, the erasing being before the copying of data.

15. The computer system of claim 1, wherein the data migration program provides for the allowing of the selective non-destructive I/O operation.

16. The computer system of claim 15, wherein the selective non-destructive I/O operation includes an I/O operation for reading a target volume parameter.

17. The computer system of claim 15, wherein the selective non-destructive I/O operation does not include an I/O operation for at least one of reading target volume data other than a target volume parameter and modifying the target volume data.

18. The computer system of claim 15, wherein the data migration program provides for determining whether an I/O operation is for at least one of reading target volume data other than a target volume parameter and modifying the target volume data.

19. The computer system of claim 15, wherein the data migration program provides for preventing an I/O operation if the I/O operation is for at least one of reading target volume data other than a target volume parameter and modifying the target volume data.

20. The computer system of claim 15, wherein the data migration program provides for determining whether an I/O operation is for at least one of reading target volume data other than a target volume parameter and modifying the target volume data, and for preventing the I/O operation if it is for at least one of reading the target volume data other than a target volume parameter and modifying the target volume data.

21. The computer system of claims 16, 17, 18, 19 or 20, wherein the target volume parameter is

at least one of a volume at least one of a volume identifier and a volume serial number.

22. The computer system of claim 1, wherein the target volume is larger than the source volume, and the data migration program provides for the allowing of the selective non-destructive I/O operation.

23. The computer system of claim 22, wherein the data migration program provides for a purging of the target volume before the data to be migrated is migrated.

24. The computer system of claim 1, wherein:

the target volume is larger than the source volume, and a number of target volume cylinders is larger than another number of source volume cylinders;

the data migration program provides for a purging of the target volume before the data to be migrated is migrated when a purge option is requested, the purging including erasing each target volume cylinder not being used for storing at least a portion of the data to be migrated, the erasing being before the copying of data; and

the data migration program provides for the allowing of the selective non-destructive I/O operation by determining whether an I/O operation is for at least one of reading target volume data other than a target volume parameter and modifying the target volume data, and for preventing the I/O operation if it is for at least one of reading the target volume data other than a target volume parameter and modifying the target volume data and allowing it otherwise.

25. The computer system of claim 24, wherein the target volume parameter is at least one of a volume at least one of a volume identifier and a volume serial number.

26. A data migration arrangement for use with a computer system, the computer system including a plurality of storage volumes, at least one storage control arrangement for controlling the plurality of storage volumes, at least one application program using data associated with the

plurality of storage volumes, at least one operating system program executable by the computer system for controlling the at least one storage control arrangement and the at least one application program, the data migration arrangement comprising:

a data migration program for data to be migrated from one of the plurality of storage volumes designated as a source volume to another one of the plurality of storage volumes designated as a target volume, the at least one application program remaining enabled for execution and for use with the data to be migrated during a migration session, the data migration program including:

a main module to provide the migration session for the data to be migrated from the source volume to the target volume;

a volume module to control the plurality of storage volumes during the migration session;

a copy module to control copying of the data to be migrated from the source volume to the target volume during the migration session; and

a monitor module to monitor an updating I/O operation to at least one of the source volume and the target volume to provide for an updating of the data to be migrated during the migration session;

wherein at least one of the following is satisfied:

the target volume is larger than the source volume; and

the data migration program provides for allowing a selective non-destructive I/O operation at the target volume.

27. A data migration arrangement for use with a computer system, the computer system including a plurality of storage volumes, at least one storage control arrangement for controlling the plurality of storage volumes, at least one application program using data associated with the plurality of storage volumes, at least one operating system program executable by the computer system for controlling the at least one storage control arrangement and the at least one application program, the data migration arrangement comprising:

a main program module to provide and control a migration session for data to be migrated from a source volume of the plurality of storage volumes to a target volume of the plurality of storage volumes, the at least one application program remaining enabled for execution and for use with the data to be migrated during the migration session;

a volume program module to control the plurality of storage volumes during the migration session;

a copy program module to control copying of the data to be migrated during the migration session; and

a monitor program module to monitor an updating I/O operation to at least one of the source volume and the target volume to provide for an updating of the data to be migrated during the migration session;

wherein at least one of the following is satisfied:

the target volume is larger than the source volume; and

the data migration program provides for allowing a selective non-destructive I/O operation at the target volume.

28. A data migration arrangement for use with a computer system, the computer system including a plurality of storage volumes, at least one storage control arrangement for controlling the plurality of storage volumes, at least one application program using data associated with the plurality of storage volumes, at least one operating system program executable by the computer system for controlling the at least one storage control arrangement and the at least one application program, the data migration arrangement comprising:

means for providing and controlling a migration session for data to be migrated from a source volume of the plurality of storage volumes to a target volume of the plurality of storage volumes, the at least one application program remaining enabled for execution and for use with the data to be migrated during the migration session;

means for controlling the plurality of storage volumes during the migration session;

means for controlling copying of the data to be migrated during the migration session;

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and

      means for monitoring an I/O operation to at least one of the source volume and the target volume to provide for an updating of the data to be migrated during the migration session;

      wherein at least one of the following is satisfied:

         the target volume is larger than the source volume; and

         the data migration arrangement provides for allowing a selective non-destructive I/O operation at the target volume.

29. A data migration arrangement for use with a computer system, the computer system being associated with a plurality of storage volumes and at least one application program, the data migration arrangement comprising:

      means for providing a migration session; and

      means for controlling the migration session for data to be migrated from a source volume of the plurality of storage volumes to a target volume of the plurality of storage volumes, the at least one application program remaining enabled for execution during the migration session;

      wherein at least one of the following is satisfied:

         the target volume is larger than the source volume; and

         the data migration arrangement provides for allowing a selective non-destructive I/O operation at the target volume.

30. A method for migrating data for use with a computer system, the computer system being associated with a plurality of storage volumes and at least one application program, the method comprising:

      establishing a migration session; and

      controlling the migration session for data to be migrated from a source volume of the plurality of storage volumes to a target volume of the plurality of storage volumes, the at least one application program remaining enabled for execution during the migration session;

      wherein at least one of the following is satisfied:

the target volume is larger than the source volume; and

the step of controlling the migration session includes the step of allowing a

selective non-destructive I/O operation at the target volume.

31. A set of instructions residing in a storage medium, the set of instructions being executable to

implement a method for migrating data for use with a computer system, the computer system

being associated with a plurality of storage volumes and at least one application program, the

method comprising:

providing a migration session; and

controlling the migration session for data to be migrated from a source volume of the

plurality of storage volumes to a target volume of the plurality of storage volumes, the at least

one application program remaining enabled for execution during the migration session;

wherein at least one of the following is satisfied:

the target volume is larger than the source volume; and

the step of controlling the migration session includes the step of allowing a

selective non-destructive I/O operation at the target volume.

32. A data migration arrangement for use with a computer system, the computer system being

associated with a plurality of storage volumes and at least one application program, the data

migration arrangement comprising:

a first data migration arrangement for providing a migration session; and

a second data migration arrangement for controlling the migration session for data to be

migrated from a source volume of the plurality of storage volumes to a target volume of the

plurality of storage volumes, the at least one application program remaining enabled for

execution during the migration session;

wherein at least one of the following is satisfied:

the target volume is larger than the source volume; and

the data migration program provides for allowing a selective non-destructive I/O

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operation at the target volume.

33. The data migration arrangement of claim 32, wherein the data migration arrangement identifies a communication data set for providing communications during the migration session, the communications data set being storable on at least one of the plurality of storage volumes other than the source volume and the target volume.

34. The data migration arrangement of claim 32, wherein the migration session includes a plurality of migration phases.

35. The data migration arrangement of claim 34, wherein the plurality of migration phases includes an activation phase, a copy phase, a refresh phase, a quiesce phase, a synchronize phase, a redirect phase, a resume phase and a termination phase.

36. The data migration arrangement of claim 32, wherein the migration session includes a plurality of migration sessions for providing concurrent data migrations.

37. The data migration arrangement of claim 32, wherein the computer system includes at least two operating systems, each of the at least two operating systems includes an instance of the data migration arrangement, one instance of the data migration arrangement being establishable as a master and another instance of the data migration arrangement being establishable as a slave so that the migration session is controllable in a master-slave relationship.

38. The data migration arrangement of claim 37, wherein the migration session includes a plurality of migration phases.

39. The data migration arrangement of claim 38, wherein the plurality of migration phases includes an activation phase, a copy phase, a refresh phase, a quiesce phase, a synchronize phase,

a redirect phase, a resume phase and a termination phase.

40. The data migration arrangement of claim 37, wherein the migration session includes a plurality of migration sessions for providing concurrent data migrations.

41. The data migration arrangement of claim 32, wherein the target volume is larger than the source volume, and a number of target volume cylinders is larger than another number of source volume cylinders.

42. The data migration arrangement of claim 41, wherein the data migration arrangement provides for a purging of the target volume before the data to be migrated is migrated.

43. The data migration arrangement of claim 42, wherein the data migration arrangement provides for the purging of the target volume when a purge option is requested.

44. The data migration arrangement of claim 42, wherein the purging includes erasing at least one cylinder on the target volume before copying of the data to be migrated.

45. The data migration arrangement of claim 32, wherein the data migration arrangement provides for the allowing of the selective non-destructive I/O operation.

46. The data migration arrangement of claim 45, wherein the selective non-destructive I/O operation includes an I/O operation for reading a target volume parameter.

47. The data migration arrangement of claim 45, wherein the selective non-destructive I/O operation does not include an I/O operation for at least one of reading target volume data other than a target volume parameter and modifying the target volume data.

48. The data migration arrangement of claim 45, wherein the data migration arrangement provides for determining whether an I/O operation is for at least one of reading target volume data other than a target volume parameter and modifying the target volume data.

49. The data migration arrangement of claim 45, wherein the data migration arrangement provides for preventing an I/O operation if the I/O operation is for at least one of reading target volume data other than a target volume parameter and modifying the target volume data.

50. The data migration arrangement of claim 45, wherein the data migration arrangement provides for determining whether an I/O operation is for at least one of reading target volume data other than a target volume parameter and modifying the target volume data, and for preventing the I/O operation if it is for at least one of reading the target volume data other than a target volume parameter and modifying the target volume data.

51. The data migration arrangement of claim 32, wherein the target volume is larger than the source volume, and the data migration arrangement provides for the allowing of the selective non-destructive I/O operation.

52. The data migration arrangement of claim 51, wherein the data migration arrangement provides for a purging of the target volume before the data to be migrated is migrated.

53. The data migration arrangement of claim 32, wherein:

the target volume is larger than the source volume, and a number of target volume cylinders is larger than another number of source volume cylinders;

the data migration arrangement provides for a purging of the target volume before the data to be migrated is migrated when a purge option is requested, the purging including erasing each target volume cylinder not being used for storing at least a portion of the data to be migrated, the erasing being before the copying of data; and

the data migration arrangement provides for the allowing of the selective non-destructive I/O operation by determining whether an I/O operation is for at least one of reading target volume data other than a target volume parameter and modifying the target volume data, and for preventing the I/O operation if it is for at least one of reading the target volume data other than a target volume parameter and modifying the target volume data and allowing it otherwise.

54. The data migration arrangement of claim 53, wherein the target volume parameter is at least one of a volume at least one of a volume identifier and a volume serial number.

55. The data migration arrangement of claim 53, wherein the target volume parameter is a volume serial number.

56. The computer system of claims 16, 17, 18, 19 or 20, wherein the target volume parameter is a volume serial number.

PRELIMINARY REMARKS

As disclosed by the Notification Regarding Litigation, which is being filed concurrently with the present application, there is a concurrent litigation between Amdahl Corp. ("the Patentee" or "Amdahl") (located at 1250 East Arques Avenue, Sunnyvale, CA 94088-3470), which is the assignee of record of the '066 Patent and of the present application, and Innovation Data Processing, Inc. ("IDP") (which is a New Jersey Corporation located at 275 Paterson Avenue, Little Falls, New Jersey 07424) for a declaratory judgment that the '066 patent is invalid.

In accordance with M.P.E.P. § 1442.02 and notwithstanding the concurrent litigation, Applicant respectfully requests that the present application be examined at this time (and that action in the present application *not be stayed*).

An Information Disclosure Statement will be filed shortly.

REMARKS

Without prejudice, this Preliminary Amendment amends original claims 1 to 7 and adds new claims 8 to 56. Accordingly, claims 1 to 56 are now pending. The new claims are believed to conform to the U.S. Patent and Trademark Office rules and do not add new matter to the application.

Pursuant to 37 C.F.R. § 1.173(c), and as discussed above, this Preliminary Amendment, without prejudice, amends original claims 1 to 7 and adds new claims 8 to 56, so that claims 1 to 56 are now pending. The explanation of the support in the disclosure of the present application (and of the '066 patent) is as follows:

The grammatical amendments to claims 1 to 7 are minor in nature and find support in the claims as originally presented and/or better satisfy the "antecedent basis" requirement. The grammatical amendments include using the article "the" instead of "said", and there have been minor punctuation changes involving the use of colons, semi-colons and commas. Additionally, the term "comprising" is now used instead of the term "having" in the preamble of claim 1.

New independent claims 26 to 32 are directed to a data migration arrangement and/or

method and include features analogous to those of claim 1 (and find support at least based on originally issued claim 1 and its corresponding specification disclosure and support), including the added features of claim 1 as now presented, and which are now discussed.

As to the features directed to the "target volume [being] larger than the source volume", these features may be found in claim 1 as now presented, as well as new claims 8, 9, 22 to 24, 26 to 32, 41 and 53. Support for these features includes that provided at lines 24 to 39 of column 8 and at lines 24 to 30 of columns 27 and 28 of the present application. This same text also supports the related features that are directed to having a "number of target volume cylinders being larger than another number of source volume cylinders", as with new claims 9, 24, 41 and 53.

In particular, as to the features directed to providing for "allowing of the selective non-destructive I/O operation by determining whether an I/O operation is for at least one of reading target volume data other than a target volume parameter and modifying the target volume data", and/or for "preventing the I/O operation if it is for at least one of reading the target volume data other than a target volume parameter and modifying the target volume data and allowing it otherwise", and/or including in which the target volume parameter is a volume identifier and/or a volume serial number, these features may be found in claim 1 as now presented, as well as new claims 15 to 32, 45 to 51 and/or 53 to 56. Support for these features includes that provided at lines 26 to 33 of columns 67 and 68 and at lines 21 to 27 of columns 69 and 70 of the present application.

As to the features directed to providing for a "purging of the target volume before the data to be migrated is migrated", and/or for "purging of the target volume before the data to be migrated is migrated when a purge option is requested", and/or in which the purging may include "erasing at least one cylinder on the target volume before the copying of data" or "erasing each target volume cylinder not being used for storing at least a portion of the data to be migrated, the erasing being before the copying of data", these features may be found in claim 1 as now presented, as well as claims 10 to 14, 23, 24, 42 to 44, 52 and/or 53. Support for these features includes that provided at lines 3 to 23 of columns 75 and 76 of the present application.

Finally, as regards claims 33 to 40, these claims include features analogous to those of original claims 2 to 7, and it is therefore respectfully submitted that support is provided by at least originally issued claims 2 to 7 and their corresponding specification disclosure and support.

Applicant asserts that the subject matter of the present application is new, non-obvious, and useful. Prompt consideration and allowance of the application are respectfully requested.

Respectfully submitted,

Dated: 4/10/2001

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